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CHEWING FOOD BASE COMPOSED OF PROTEINS AND  
TANNIN

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[54] Title: CHEWING FOOD BASE COMPOSED OF PROTEINS AND TANNIN

## Specification

### 1. Title

CHEWING FOOD BASE COMPOSED OF PROTEINS AND TANNIN

## 2. Claims

1. A chewing food base characterized by the fact that it is composed essentially of proteins and tannin and contains 10-60 weight percent tannin relative to the proteins.

2. The chewing food base in accordance with Claim 1 wherein the tannin content is 20-55 weight percent relative to the proteins.

3. The chewing food base in accordance with Claim 1 or 2 to which polyvalent alcohols are added.

4. The chewing food base in accordance with any of Claims 1-3 wherein the proteins are of at least one type selected from the group consisting of fibrous proteins, alkali-treated fibrous proteins, spherical proteins, and alkali-treated spherical proteins.

## 3. Detailed Description of the Invention

The present invention concerns a new chewing food base suitable for chewing-type food, especially for chewing gum-type food and film-forming bubble gum-type food.

### Prior Art

Chewing gums and film-forming bubble gums are known in the food industry as representative of chewing-type food. Edible chewing food composed solely of gluten is also known (eg, Patent Publication No. 37-13701).

In the chewing gum industry, it is known that various additives have been compounded with a chewing gum base (simply called gum base) to prevent dental caries, bad breath, and adhesion of the gum to the teeth. For example, Patent Publication No. 47-15732 describes the compounding of a chewing gum base with

an additive composed of proteins and tannin in order to prevent adhesion of the gum to the teeth.

These conventional chewing gums are roughly divided into the following two groups: (1) chewing gums with a base that decomposes or dissolves gradually, leaving no residues (Patent Publication No. 37-13701, for example); and (2) chewing gums having a chewing gum base that persists even after hours of chewing (a chewing gum is a typical example).

The former is composed of an edible base such as cellulose and gluten, which is specially treated to have a texture to withstand chewing, while the latter uses an appropriate mixture of natural resins such as chicle and jelutong, synthetic resins such as vinyl acetate, and natural or synthetic rubber.

The present inventors conducted studies to find base materials suitable for chewing-type food while considering the availability of such materials and their applicability as food items. Consequently, they confirmed that combining protein and tannin in specific proportions results in the formation of a chewing base which resembles chewing gum bases, leaving residues after prolonged chewing. It was also discovered that modification of the protein-tannin ratio results in the formation of a base resembling those of bubble gums capable of forming films.

Furthermore, the chewing base thus produced was found not to adhere to substances such as tooth surfaces, concrete, tiles, and seat covers. If it sticks to any of these surfaces temporarily, separation can be easily performed.

### Problems to be Solved by the Present Invention

The purpose of the present invention is to provide a new chewing base which is suitable for a wide variety of chewing-type foods and can be produced from readily available natural materials.

Another purpose of the present invention is to provide a new chewing base which does not adhere to or can be easily separated from various structural materials and is particularly suitable for the production of chewing gum-type food.

Still another purpose of the present invention is to provide a new chewing base which does not adhere to or is easily separated from other materials (as described above) but is capable of forming a film and is therefore suitable for manufacturing bubble gum-type products.

Thus the present invention intends to enhance the technology in the food producing industry.

### Methods of Solving the Problems

According to the present invention, the above-stated purposes can be achieved by the use of a chewing base composed essentially of proteins and tannin in the amount of 10-60 weight percent relative to the proteins.

This new chewing base of the present invention is suitable for producing chewing food (especially chewing gums) which leaves residues after long hours of chewing.

If the tannin content relative to the proteins is set at 20-55 weight percent, this base becomes suitable for the production of bubble gum-type food with a capacity to form films.

The new chewing material of the present invention is composed essentially

of proteins and tannin, but an appropriate amount of polyvalent alcohols such as glycerin and propylene glycol may be combined to facilitate the manufacturing process and improve the properties of the chewing base.

Fibrous protein is most suitable as the protein to be used in the present invention, but alkali-treated proteins, spherical and alkali-treated spherical proteins, and enzyme-treated proteins may also be used depending on the purpose of the chewing base. In most instances, proteins commonly available on the market - such as gelatin, gluten, casein, and albumin - are used.

All substances that satisfy the general definition of tannin as "a phytogetic water-soluble polyphenol compound which binds proteins and alkaloids, forming precipitates in solution" can be used for the present invention; however, tannic acid, as defined by the Pharmacopoeia, is most suitable.

In producing the new chewing material of the present invention, the critical tannin content (computed as tannic acid) is 10-60 weight percent relative to the proteins. If the proportion is below this range, the composition dissolves during chewing and no chewing base is formed, whereas if the proportion exceeds the upper threshold of the range, the composition becomes too hard and is unsuitable for chewing.

The present invention is described below in relation to chewing gum, the most typical chewing-type food. However, it is understood that the base proposed by the present invention can be used for several types of food.

The hardness of chewing gums currently on the market is defined by a flow tester as a viscosity of  $3 \times 10^3$  to  $1 \times 10^5$  poise after 5 minutes of chewing. This viscosity is determined using a Shimazu flow tester CFT-500 under the

following conditions:

Plunger	1.00 cm <sup>2</sup>
Die (length)	2.00 mm
Die (diameter)	1.00 mm
Load	120.0 KgF
Position max.	15.00 mm
Position min.	5.00 mm
Preheating time	100.0 sec
Setting temperature	36.0°C

The flow tester viscosity after 5 minutes of masticating the chewing food prepared using the chewing base of the present invention was found to be from  $1 \times 10^3$  to  $1 \times 10^5$  poise, a range close to but slightly wider than that given above. If the protein-tannin ratio is more narrowly defined, the product will have not only a hardness in this range but also the capacity to develop a film, and will thus be suitable for the production of bubble gums. Furthermore, such a product is obviously unlikely to adhere or will have the capacity to separate easily.

The chewing base of the present invention is prepared in the following manner: A small amount of water is added to protein, which is then dissolved by heating; the solution is combined with tannin in the above-stated amount while being agitated and is then further continuously agitated over a prescribed length of time to increase the viscosity. If the protein is fibrous, the product can be used as is. Otherwise (if spherical protein is used in particular), the protein may be treated with an alkali or an enzyme prior to use to render it near-fibrous, or may be pH-adjusted after the

treatment during the production of the base. It is obviously important that the protein-tannin ratio be maintained throughout this process.

The new chewing base of the present invention may be combined with conventional food additives such as sweetening agents, fragrances, and coloring agents to produce a chewing food that can be chewed like a chewing gum. Needless to add, the product can be processed in a variety of forms.

#### **Effects of the Present Invention**

The new chewing base of the present invention is composed chiefly of protein, a natural material suitable for use in food, and tannin, also a natural product, which has been known for its various therapeutic effects. Therefore, it is not only suitable as a food item but also has the advantage of being a readily available material.

The chewing food, especially chewing gum-type food, produced using the chewing base of the present invention has the following advantages: It does not stick and peels easily from the surface of most materials; a film-forming property can be conferred to the base, if necessary, for the manufacture of bubble gum-type food; such a film readily expands and has satisfactory luster and clarity but does not stick to the skin upon rupture.

This new chewing base may be used for a wide variety of food products even outside the category of chewing gums, thus contributing to the food production technology.

#### **Examples**

The chewing base of the present invention is explained further in relation to chewing gum-type food, but needless to add, the invention is also



applicable to all types of food that require stability to prolonged chewing.

#### Example 1

Acid-treated gelatin (200B) powder	100 g
Water	80 mL
Glycerin	40 g
Refined tannin powder (tannic acid content, 90%)	33 g

To 100 g of gelatin, 80 mL of water was added; this system was then heated in a water bath for complete dissolution of the gelatin. The solution was combined with 40 g of glycerin. After adjusting the temperature to a range of 55-60°C, 33 g of tannin powder was added to the solution and stirred. After mixing for 5 minutes to raise the viscosity to the desired level, a chewing base was obtained.

#### Example 2

Gluten powder	100 g
Water	85 mL
Glycerin	40 g
Refined tannin powder (tannic acid content, 90%)	50 g
NaOH	50 g
HCl	as appropriate

Gluten powder (100 g) was combined with 40 g of glycerin, and the system was thoroughly mixed in a small kneader. Next, 80 mL of water and then 50 g of refined tannin powder were added to the mixture, which was then stirred thoroughly. 5 g NaOH (50 percent NaOH), dissolved in 5 mL of water, was

added, and the mixture was kneaded while being heated in a range of 50-78°C. After kneading for approximately 10 hours, a chewing base with a satisfactory film-forming capacity was obtained. By using an appropriate amount of HCl, the pH was adjusted to a range of 5-7.

### Example 3

The chewing bases produced in Examples 1 and 2 were combined with powdered sugar or stevioside powder and maltose powder (dilute stevioside) and kneaded to produce chewing gum-type sheets.

These chewing gum sheets and commercial chewing gums composed chiefly of conventional natural resins were evaluated by a 20-member panel for their chewing quality. Consequently, an average of 17 members rated the product of the present invention as superior to the commercial product. In addition, the product using the base of Example 1 was subjected to a more detailed evaluation in comparison with conventional bubble gums. In the table below, the figures represent the numbers of panel members who selected the product represented in the respective column.

	Example 1	Conventional product
Softness when chewed	12	8
Ease of bubble blowing	14	6
Clarity of the bubble	20	0
Luster of the bubble	20	0
Adhesion to the skin (when the bubble is broken)	20	0

The results of the above panel test indicated that the chewing gum sheets produced from the compositions of the present invention were superior to conventional products.

#### Example 4

Chewing bases were prepared according to the sequence of Example 1 except that the proportions of protein and tannin were altered as shown in the table below (3 parts glycerin and 6.3 parts water were used for components other than protein and tannic acid).

Test no.	1	2	3	4	5	6	7 com- par- ison
protein	7.5	7.5	7.5	7.5	7.5	7.5	7.5
tannic acid	0.75	1.0	1.5	2.0	4.1	4.5	5.0
(percentage relative to protein)	10%	13%	20%	27%	55%	60%	67%

A test was conducted on the gum base forming properties of these products:

No. 1 dissolved during chewing and failed to form a gum base.

30 percent of the initial volume (in weight) of No. 2 formed a gum base.

80 percent of the initial volume (in weight) of No. 3 formed a gum base.

100 percent of the initial volume (in weight) of No. 4 formed a gum base.

No tannin was found to migrate out of the composition.

120 percent of the initial volume (in weight) of Nos. 5-7 formed a gum base.

No. 7 showed a composition with a ratio cited in Patent Publication No. 47-15732 by Wrigley (a comparative example).

The flow tester viscosities of Nos. 5-7 were determined after chewing for 5 minutes. Rapid changes in viscosity were noted as follows: No. 5,  $6 \times 10^4$  poise; No. 6,  $1 \times 10^5$  poise; and No. 7,  $7 \times 10^5$  poise.

Next, the flow tester viscosities (determined by the method described earlier) of commercial chewing gums were determined after chewing for 5 minutes. Almost all were found to be within the range of  $3 \times 10^2$  to  $1 \times 10^5$  poise. Therefore, the composition with the tannin percentage, relative to the proteins, shown for No. 7 (67 percent) by way of comparison was found to be too hard and therefore unsuitable as a gum base.

#### Example 5

A chewing base of the present invention was prepared using 3.0 parts tannic acid, 7.5 parts gelatin, 3.0 parts glycerin, and 6.3 parts water. Bubble gum pieces produced from this chewing base, a commercial bubble gum, and a commercial sheet-type gum were used to test for adhesion of their residues to the surfaces of various structural materials. The results are shown below.

The following test conditions existed in obtaining the results shown in the table below.

(1) The test was conducted using Fudo Kogyo Rheometer NRM-2002J.

(2) Asphalt or plastic tiles were attached to both the adapter and counter. A sample was placed at the center of the two sandwiching pieces of material which were then pressed together under 1 kg of pressure. The pieces were then separated, and the force required to detach the sample adhering to

S u r f a c e material	Chewing gums		
	Bubble gum prepared according to the present invention	Commercial bubble gum	Commercial sheet-type gum
Plastic tile	0 ⑦	320	660 < ③
Asphalt	100	260 ③	700 < ③
Concrete	0	670 < ③	670 < ③
Sheet material	0	620 < ③	650 < ③

the material was determined. The product of the pulling tension times the duration of adhesion in seconds (g·s) was compared.

(3) The movable portion of the rheometer was too short to continue determination of the complete separation of the bubble gum and the sheet-type gum.

(4) Higher figures represent higher viscosity.

(5) The 3 samples were tested after they were chewed for 5 minutes.

(6) The samples were spherical and weighed 0.2 g.

(7) Part of the sample was embedded in a surface indentation of the asphalt. Therefore, the conditions were not considered as representative of adhesion.

(8) The commercial bubble gum and sheet-type gum were composed chiefly of synthetic resins.

(9) The adapter velocity of the rheometer was 20 cm/minute for both up and down motions.

As evident from the above results, the new chewing base of the present

invention does not adhere to the surfaces of various materials such as plastic tiles, concrete, and seat covers. Even when it does adhere (as on the asphalt surface in the above test), it can be easily removed.

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⑫ 公開特許公報(A)

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審査請求 未請求 発明の数 1 (全5頁)

⑭ 発明の名称 タンパク質とタンニンとからなるチューイング基材

⑯ 特 願 昭61-150688

⑰ 出 願 昭61(1986)6月28日

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明 細 書

1. 発明の名称

タンパク質とタンニンとからなる  
チューイング基材

2. 特許請求の範囲

- (1) タンパク質とタンニンとから実質的になり、タンパク質に対するタンニンの比率が10~60重量%の範囲内にあることを特徴とするチューイング基材。
- (2) タンパク質に対するタンニンの比率が20~55重量%の範囲内である特許請求の範囲第1項に記載のチューイング基材。
- (3) 多価アルコール類をさらに含有してなる特許請求の範囲第1項または第2項に記載のチューイング基材。
- (4) タンパク質が繊維状タンパク質、アルカリ処理された繊維状タンパク質、球状タンパク質およびアルカリ処理された球状タンパク質よりなる群から選択される少なくとも1種である特許請求の範囲第1項乃至第3項のいす

れかに記載のチューイング基材。

3. 発明の詳細な説明

(産業上の利用分野)

本発明は、チューイング食品に適した新規なチューイング基材に関し、特にチューインガム様食品および成膜性を有する風船ガム様食品の製造に適した新規なチューイング基材に関するものである。

(従来の技術)

食品業界においてチューイング食品としては典型的にはチューインガム或いは成膜性を要する風船ガムなどが周知されており、またグルテンのみからなる可食性のチューイング食品も知られている(たとえば特公昭37-13701号)。

さらに、チューインガムの分野では歯付防止、虫歯予防、口臭除去などの目的でチューインガム基材(ガムベースとも云う)に各種の添加物を配合することも知られており、たとえば特公昭47-15732号公報はチュ

PATENTS SUMMARY

04/23/99

Page 1

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Title:

CHEWING FOOD BASE COMPOSED OF PROTEINS AND TANNIN

Desc.:

Chewing gum base is prepared with proteins (gelatin, gluten, casein and albumin) and tannins (tannic acid). Glycerin and propylene glycol may be added. Conventional and bubble gum can be made. The gum does not adhere to teeth and structural materials. A viscosity measurement method is given. A Wrigley patent composition is used for comparison.

Key Words:

10 CHEWING GUM  
15 Bubble Gum  
350 GUM BASE  
371 Softeners/Plasticizers  
451 Glycerin, Propylene Glycol  
457 Proteins/Amino Acids  
474 Gelatin (Gels)  
485 Tannins  
502 Base Manufacture/Preparation  
552 Soft/Hard/Tough  
554 Viscosity  
576 Non-sticking  
661 Physical Testing  
714 Lotte  
803 Japan